REMARKS

In response to the office action the following items are addressed regarding the claims:

1. Examiner rejects claim 1. Applicants have amended the indefinite language in claim 1 to specify that the edge-on radiation detectors measure electronically-determined interaction height. Interaction height refers to position of the event along the aperture height when the radiation detector is oriented in an edge-on geometry. (If the detector orientation was face-on, this aperture height would be redefined as the thickness dimension of the face-on detector and the face-on detector would measure the electronically-determined interaction depth.) See application, page 10, lines 14-19; page 10, line 23 and page 11, lines 1-23. El-Hanany et al. do not describe edge-on detectors that increase spatial resolution and energy resolution by measuring electronically-determined interaction height.

2. Examiner rejects claim 2. Applicants have amended the indefinite language in claim 2 to specify that the face-on radiation detectors measure electronically-determined interaction depth. See application, page 10, lines 14-19; page 10, line 23 and page 11, lines 1-23; page 46, Fig. 11b. El-Hanany et al. do not describe face-on detectors that increase spatial resolution and energy resolution by measuring electronically-determined interaction depth.

3. Examiner rejects claims 3-4. Applicants have amended the indefinite language in claim 3 to specify the specific properties (design parameters) of the edge-on radiation detectors that can be varied within a detector module and corrected a spelling error. See application, page 5, lines 14-16; page 19, line 6-11. El-Hanany et al. do not describe varying edge-on radiation detector design parameters such as detector material, spatial resolution, energy resolution, response time, readout rate, and noise characteristics within a detector module. Applicants have canceled claim 4.

4. Examiner rejects claims 5,6,7. Claims 5,6,7 are dependent on claim 1. Applicants have amended claims 5,6,7 by specifying that the detectors are semiconductor detectors. Claim 7 was further amended to specify a "dual-sided" 2-D pixilated detector that is consistent with the language of claims 5,6. See application, page 12, lines 7-13. El-Hanany et al. do not describe edge-on strip, crossed strip, or 2-D pixilated semiconductor detectors that increase spatial resolution and energy resolution by measuring electronically-determined interaction height.

5. Examiner rejects claim 8. Applicants have amended the indefinite language in claim 8 to specify the specific benefit (increasing the detector attenuation length presented to the incident radiation) that results from stacking edge-on detectors one on top of another. See application, page 47, lines 6-14. El-Hanany et al. uses

the term "stack" to refer to an array of edge-on detectors (like a stack of cards turned on its side).

6. Examiner rejects claim 9. Claim 9 is dependent on claim 8. Applicants have amended the indefinite language in claim 9 to specify the stacked detectors are comprised of detector layers that that use at least two different detector materials. See application, page 36, lines 19-23 and page 37, lines 1-2; page 47, lines 6-14. El-Hanany et al. in Fig. 3A describe element 118 to be made from a polymer material which does not function as a detector material.

7. Examiner rejects claims 10,11. Applicants have amended the indefinite language in claim 10 to specify the specific mechanical adjustments (elevating, tilting, rotating) that can be employed to reposition edge-on detectors and detector modules. See application, page 50, lines 6-23 and page 51, lines 1-8. El-Hanany et al. do not describe capabilities of mechanically repositioning detectors and detector modules. Claim 11 is canceled.

8. Examiner rejects claims 12,13. Applicants have amended the indefinite language in claim 12 to specify the coarse Compton collimator is mounted in front of the enhanced Compton gamma camera. Nuclear medicine gamma camera collimators provide fine resolution in order to define a narrow range of acceptance angles for the incident gamma rays. The fraction of useful gamma rays that are lost due to attenuation by the collimator is staggeringly high. A nuclear medicine Compton gamma camera offers a tremendous increase in efficiency by not using a conventional collimator but instead implements electronic collimation within the detector itself by following the path of the Compton scattered gamma ray. The advantage of mounting a coarse Compton collimator is that this coarse collimator (which does not determine spatial resolution) primarily attenuates gamma rays that would enter the Compton camera at relatively shallow angles and thus have a high probability of passing through many edge-on detectors and possibly multiple edge-on detector modules. This greatly simplifies the most likely edge-on detectors to search when a Compton scatter event occurs in an edge-on detector. See application, page 49, lines 15-23 and page 50, lines 1-5. Nygren is certainly aware of slit collimators used to define multiple, directional x-ray beams and reduce x-ray scatter between beams, but this is for conventional x-ray radiography (not appropriate for nuclear medicine where the collimator also defines spatial resolution). Nygren does not describe a collimator for use with a Compton gamma camera or even for nuclear medicine. Claim 13 has been amended to be an independent claim. The nature of the coarse Compton collimator in claim 13 is to shield alternate edge-on detectors from direct radiation. The claim 12 coarse Compton collimator simply attempts to restrict the range of incident angles for gamma rays reach the face of the Compton camera. No specific edge-on detectors are excluded from receiving direct gamma radiation. The coarse Compton collimator of claim 13 is functionally different from the moving collimator described by Pfoh for CT imaging. In the case of Pfoh, the half of each detector pixel shielded by the collimator during an x-ray pulse is assumed to be inactive

and thus does not contribute to the total signal from the detector pixel. The coarse Compton collimator described in claim 13 shields specific edge-on detectors from direct radiation but they are still active, functioning as Compton scatter detectors due to the Compton scattered radiation from the neighboring edge-on detectors that are directly irradiated. There is an intentional loss of efficiency in the direct detection of incident gamma rays in the shielded edge-on detectors in order to improve their ability to analyze events that are likely to be Compton scatter events rather than a mix of Compton scatter and direct events.

9. Claim 14 is canceled.

10. Examiner rejects claims 15,16. Claims 15 and 16 are dependent on claim 1. Claim 15 is original. Claim 16 is amended to correctly refer to claim 1 rather than claim 15. Both enhanced gamma and PET cameras represent a subset of the capabilities of an enhanced Compton gamma camera. Specific implementations of these capabilities would be customized or tuned to either the enhanced gamma or PET camera and the particular application. For example, uniform depth of interaction (DOI) resolution is preferred in an enhanced Compton camera whereas this feature may not be cost-justified for an enhanced gamma camera. For an enhanced PET camera non-uniform (or even no) DOI capability may be acceptable (in specific cases). See application, page 38, lines 1-19. While El-Hanany et al. describe conventional edge-on gamma cameras and PET cameras, he do not describe gamma and PET cameras with edge-on detectors that increase spatial resolution and energy resolution by measuring electronically-determined interaction height.

11. Claim 17 is canceled.

12. Examiner rejects claims 18,19. Claims 18 and 19 are dependent on claim 1. Claims 18 and 19 are amended to correctly refer to claim 1 rather than claim 15. El-Hanany et al. do not describe edge-on detectors that increase spatial resolution and energy resolution by measuring electronically-determined interaction height. While El-Hanany et al. refer to "x-ray and gamma ray" on page 1, paragraph 0001, this refers to radionuclide sources used in nuclear medicine, some of which emit gamma rays and x-rays. El-Hanany et al. does not describe x-ray sources (x-ray tubes) necessary for x-ray and CT radiography. As noted with gamma and PET camera implementations of the enhanced edge-on Compton gamma camera, a specific feature such as DOI resolution may be turned off or it may be used to discriminate against low and high energy x-rays. In addition, the edge-on detectors could be used as energy integrators instead of analyzing discreet events as is done with a Compton camera, See application, page 39, lines 1-18.

13. Examiner rejects claim 20. Claim 20 is dependent on claim 1. Claims 20 is amended to describe the direction the radiation is incident from with respect to the plane of the edge-on detector array. See application, page 52, lines 1-5. El-

Hanany et al. does not describe edge-on detectors that increase spatial resolution and energy resolution by measuring electronically-determined interaction height.

14. Examiner rejects claims 21-23. Applicants have amended claim 21 to specify a method for increasing the spatial and energy resolution of an edge-on detector used in nuclear medicine by implementing a calibration procedure for edge-on detectors that measure electronically-determined aperture height and energy corrections. See application page 41, lines 13-16. El-Hanany et al. only describe "hardwired" resolution such as DOI that is determined by the pixel pitch in a row or column aligned with the incident radiation for a 2-D edge-on detector. Interaction height measurements and energy corrections are not described. El-Hanany et al. have no reason to perform the specific calibration procedure needed to exploit the sub-aperture resolution capabilities of our edge-on detectors. Claims 22, 23 are canceled.

15. Claim 24 is a new claim. Claim 24 is dependent on claim 1. Claim 24 is added in the spirit of claims 5,6,7 that describe specific edge-on semiconductor detector readout geometries that can measure electronically-determined interaction height and thus provide improved spatial and energy resolution. Claim 24 describes edge-on scintillator detector geometries that can measure electronically-determined interaction height and provide energy corrections. See application, page 41, line 17-23 and page 42, lines 1-23 and page 43, lines 1-9.

CONCLUSION

Applicants respectfully submit that the amended claims overcome the Examiner's objections. Applicants invite the Examiner to telephone the undersigned representative if a telephonic interview would help advance this case to allowance.

Respectfully submitted,

By: *Robert Sigurd Nelson* Dated: *June 8, 2006*

Robert Sigurd Nelson

Robert Sigurd Nelson
2922 Upshur Street
San Diego, California 92106
Phone (work): (619) 594-1013.